

CLAIMS

1. An integrated hybrid electrochemical device comprising, (1) housing, (2) a first set of electrodes in said housing which, in the charged state, comprises a NiOOH electrode, and a dissociable metal-hydride electrode, (3) a second set of electrodes within said housing comprising a hydrogen gas-diffusion electrode and an oxygen/air gas-diffusion electrode, (4) an alkali metal hydroxide electrolyte common to all of said electrodes, (5) an oxygen/air plenum confronting said oxygen/ air gas-diffusion electrode for supplying air to said air oxygen/gas-diffusion electrode, and (6) a hydrogen plenum confronting said hydrogen gas-diffusion electrode for supplying hydrogen to said hydrogen gas-diffusion electrode.

2. A hybrid electrochemical device according to claim 1 wherein said oxygen/air plenum also confronts said nickel hydroxide electrode and supplies oxygen/air to said nickel hydroxide electrode, and said hydrogen plenum also confronts said metal-hydride electrode and supplies hydrogen to said metal hydride electrode.

3. A hybrid electrochemical device according to claim 1 wherein said metal-hydride is a hydride of a transition metal.

4. A hybrid electrochemical device according to claim 1 further comprising an electrolyte absorbent separator interjacent said NiOOH and metal-hydride electrodes and wetted by said electrolyte.

5. A hybrid electrochemical device according to claim 4 comprising an electrolyte compartment remote from said first set of electrodes and containing said electrolyte between said gas-diffusion electrodes, said separator communicating with said chamber.

6. An integrated hybrid electrochemical device comprising, (1) housing, (2) a first set of electrodes within said housing which, in the charged state, comprises a NiOOH electrode and an electrochemically dissociable metal-hydride electrode, (3) a second set of electrodes within said housing comprising a hydrogen gas-diffusion electrode and an oxygen/air gas-diffusion electrode, (4) an alkali metal hydroxide electrolyte common to all of said electrodes, (5) an oxygen/air plenum confronting said air gas-diffusion electrode and said NiOOH electrode for supplying oxygen/air to said oxygen/air gas-diffusion and NiOOH electrodes, (6) a hydrogen plenum confronting said hydrogen gas-diffusion electrode and said metal hydride electrode for supplying hydrogen to said hydrogen gas-diffusion and metal hydride electrodes, (7) a first current collector common to both said oxygen/air gas-diffusion and said NiOOH electrodes for collectively conducting electrical current from said oxygen/air-diffusion and said NiOOH electrodes upon discharge of said device, and (8) a second current collector common to both said hydrogen gas-diffusion and said metal-hydride electrodes for collectively conducting electrical current from said hydrogen-diffusion and said metal-hydride electrodes upon discharge of said device.

7. A hybrid electrochemical device according to claim 6 wherein said NiOOH electrode contacts said oxygen/air-diffusion electrode on said current collector.

8. An integrated hybrid electrochemical device comprising, (1) a housing (2) a first set of electrodes within said housing which, in the charged state, comprises a NiOOH electrode, and an electrochemically dissociable metal-hydride electrode, (3) a second set of electrodes within said housing comprising a hydrogen gas-diffusion electrode and an oxygen/air gas-diffusion electrode, (4) an alkali metal hydroxide electrolyte common to all

of said electrodes, (5) an oxygen/air plenum confronting said oxygen/air gas-diffusion electrode and said NiOOH electrode for supplying oxygen/air to said oxygen/air gas-diffusion and NiOOH electrodes, (6) a hydrogen plenum confronting said hydrogen gas-diffusion electrode and said metal hydride electrode for supplying hydrogen to said hydrogen gas-diffusion and metal hydride electrodes, and (7) separate current collectors for each of said electrodes whereby electrical current can be conducted from each of said sets independently of the other of said sets.

9. An integrated hybrid electrochemical device comprising, (1) a housing, (2) a first set of electrodes within said housing which, in the charged state, comprises a NiOOH electrode, and a dissociable metal-hydride electrode, (3) a second set of electrodes within said housing comprising a hydrogen gas-diffusion electrode and an oxygen/air gas-diffusion electrode, (4) an electrolyte chamber between said second set of electrodes for containing an alkali metal hydroxide electrolyte common to all of said electrodes, (5) an oxygen/air plenum confronting said oxygen/air gas-diffusion electrode for supplying oxygen/air to said oxygen/air gas-diffusion electrode, (6) a hydrogen plenum confronting said hydrogen gas-diffusion electrode for supplying hydrogen to said hydrogen gas-diffusion electrode, and (7) a porous, electrolyte-wetted material separating said first set of electrodes one from the other and communicating with said electrolyte in said chamber, said first set of electrodes being isolated from said plenums so as not to be exposed to hydrogen or air from said plenums.

10. A hybrid electrochemical device according to claim 9 wherein said gas diffusion electrodes are covered by said material.

11. A hybrid electrochemical device according to claim 1 wherein said gas diffusion electrodes comprises an H₂-storing catalyst, and said oxygen/air gas diffusion electrode comprises an O₂-storing catalyst